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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/522,761	01/28/2005	Geir Westgaard	03438.0111-00000	9301

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FINNEGAN, HENDERSON, FARABOW, GARRETT & DUNNER LLP
901 NEW YORK AVENUE, NW
WASHINGTON, DC 20001-4413

EXAMINER	
BROOME, SAID A	
ART UNIT	**PAPER NUMBER**
2628	

DATE MAILED: 09/08/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/522,761	WESTGAARD ET AL.	
	Examiner	Art Unit	
	Said Broome	2628	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *7/31/02*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-26* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-26* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 101

35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claims 1-26 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. Claim 1 recites: "A method for creating an irregular mesh…" and claim 18 recites "Method for arranging data in order to describe an irregular mesh…", however no tangible result is produced. Therefore, the claimed invention does not posses "real world" value, and instead represents nothing more than a methods of creating and arranging data in order to describe an irregular mesh and a method arranging data in order to describe an irregular mesh comprising creating data structures. Therefore due to the lack of a concrete tangible result in claims 1, 6 and 18, as well as failure to present support in the Specification for a tangible result, the claims 1-26 are non-statutory. The tangible requirement does not necessarily mean that a claim must either be tied to a particular machine or apparatus or must operate to change articles or materials to a different state or thing. However, the tangible requirement does require that the claim must recite more than a § 101 judicial exception, in that the process claim must set forth a practical application of that § 101 judicial exception to produce a real-world result. Benson, 409 U.S. at 71-72, 175 USPQ at 676-77 (invention ineligible because had "no substantial practical application."). In State Street, the Federal Circuit examined some of its prior section 101 cases, observing that the claimed inventions in those cases were each for a "practical application of an abstract idea" because the elements of the invention operated to produce a "useful, concrete and tangible result." State Street, 149 F.3d at

1373-74, 47 USPQ2d at 1601-02. For example, the court in State Street noted that the claimed invention in Alappat "constituted a practical application of an abstract idea (a mathematical algorithm, formula, or calculation), because it produced 'a useful, concrete and tangible result'—the smooth waveform." Id. Similarly, the claimed invention in Arrhythmia "constituted a practical application of an abstract idea (a mathematical algorithm, formula, or calculation), because it corresponded to a useful, concrete and tangible thing—the condition of a patient's heart."

Claims 11-17 are rejected under 35 U.S.C. 101 because the claims contain a computer program, which is non-statutory subject matter because a program must be encoded on a computer readable medium for causing the computer to execute in order to be considered statutory subject matter. Similarly, computer programs claimed as computer listings per se, i.e., the descriptions or expressions of the programs, are not physical "things." They are neither computer components nor statutory processes, as they are not "acts" being performed. Such claimed computer programs do not define any structural and functional interrelationships between the computer program and other claimed elements of a computer which permit the computer program's functionality to be realized. In contrast, a claimed computer-readable medium encoded with a computer program is a computer element which defines structural and functional interrelationships between the computer program and the rest of the computer which permit the computer program's functionality to be realized, and is thus statutory. See Lowry, 32 F.3d at 1583-84, 32 USPQ2d at 1035. Accordingly, it is important to distinguish claims that define descriptive material per se from claims that define statutory inventions.

Claim 17 is rejected under 35 U.S.C. 101 because claim 17 recites: "a propagated signal". In reference to the Specification on page 19 lines 18-20 it is stated that the computer program product is carried on a propagated signal, therefore claim 17 is not statutory because storing a computer program via a signal is a nonstatutory natural phenomena. Claims that recite nothing but the physical characteristics of a form of energy, such as a frequency, voltage, or the strength of a magnetic field, define energy or magnetism, per se, and as such are nonstatutory natural phenomena. O'Reilly, 56 U.S. (15 How.) at 112-14. Moreover, it does not appear that a claim reciting a signal encoded with functional descriptive material falls within any of the categories of patentable subject matter set forth in § 101. First, a claimed signal is clearly not a "process" under § 101 because it is not a series of steps. The other three § 101 classes of machine, compositions of matter and manufactures "relate to structural entities and can be grouped as 'product' claims in order to contrast them with process claims." 1 D. Chisum, Patents § 1.02 (1994). The three product classes have traditionally required physical structure or material.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-4 and 6-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dunnett et al.(hereinafter referred to as "Dunnett", US Patent 7,027,050) in view of Levy et

al.(hereinafter referred to as "Levy", "*Cellular Modeling in Arbitrary Dimension using Generalized Maps*").

Regarding claim 1, Dunnett teaches receiving topological input data in column 7 lines 8-9 ("*The 3D modelling data at step S2 may be input to computer 2 on a storage medium…*"), in which the input data represents vertices and faces of the mesh, as described in column 12 lines 53-57 ("*…this database stores information about each triangle in each model, particularly about the edges and vertices of each triangle…*"). Dunnett illustrates associating coordinates in space with the vertices of the mesh in Figure 10 where it is shown that vertices of the mesh have a corresponding coordinate. Dunnett teaches creating a geometric description, or topology, from the mesh in column 7 lines 52-54 ("*…CPU 4 constructs and stores a topology database for each model of each object.*") and in column 6 lines 65-67 ("*…three-dimensional modelling data defining one or more objects…This data comprises a polygonal mesh model…*") and, where it is described that a topology of the mesh is constructed. Dunnett illustrates creating a refined mesh based on the first mesh and the coordinates, in Figure 2, where it shown in step s16 that the mesh model is refined based on the input topological data that comprises the coordinates and vertices of the mesh, as shown in step s6. Dunnett teaches using coordinates associated with the vertices, as shown in Figure 10, of the refined mesh, as described in column 16 lines 54-58 ("*…to refine each triangular polygon in the model of an object into a larger number of smaller triangles which more accurately represent the object…*") to compute control points, as described in column 12 lines 46-47 ("*Control points 90, 96 and 102 are located at the triangle vertices.*"), and using the control points to create surface patches associated with the first mesh in column 12 lines 43-46 ("*…control points are used to calculate the ordinates which define a cubic*

Bernstein-Bezier triangular patch…"). However, Dunnett fails to teach creating a G-map representation of the topology of the mesh based on the input data. Levy teaches creating a G-map representation of the topology a mesh in the abstract lines 8-12 ("*The G-Map representation relies on no more than a single type of element together with a single type of relation to define the topology of arbitrary dimensional objects…*"), therefore it one of ordinary skill would have been capable of utilizing any arbitrary topology data to construct a G-map representation, such as the input topology data taught by Dunnett. Therefore it would have been obvious to one of ordinary skill in the art to combine the teachings of Dunnett with Levy because this combination would provide an improved representation of a surface of arbitrary topology by representing the refined mesh surface using generalized maps.

Regarding claims 2 and 7, Dunnett teaches the refined mesh is created by applying a mesh refinement algorithm in column 16 lines 54-58 ("*…to refine each triangular polygon in the model of an object into a larger number of smaller triangles which more accurately represent the object…*"), and where each patch of the first mesh is created as a surface spline associated with a quad of the first mesh, in column 32 lines 1-5 ("*…each object may be modelled using other forms of polygons and patches other than triangular patches may be used to refine each polygon…each object may be modelled using rectangles.*"), where it is described that the surface of the mesh may be represented as a rectangular patch or quad.

Regarding claims 3 and 8, Dunnett fails to teach the limitations. Levy teaches creating a G-map comprises the steps of creating a set of darts each associated with one vertex and one face of the first mesh in the caption of Figure 6 ("*…the aim is to retrieve the darts corresponding to the same 0-cell (vertex), 1-cell (edge) and 2-cell (face) as d.*"), where it is described that one

vertex and face associated with a dart is determined. Levy illustrates creating a number of involutions that establish associations between pairs of darts so that an α_0 involution links two darts associated with adjacent vertices but the same face, creating an edge, an α_1 involution links two darts associated with the same vertex and the same face, and an α_2 involution links two darts associated with the same vertex but adjacent faces, linking two adjacent faces in Figures 4A, 4B and 4C respectively were the respective relationships between the involutions and their pair of darts as shown, as described in section 3.2 second paragraph lines 6-10 ("*...the function α_0 connects each pair of darts shown in Figure 4-A, i.e. for such a pair (d1; d2)...The function α_1 connects each pair of darts shown in Figure 4-B and the function α_2 connects each pair of darts shown in Figure 4-C.").* The motivation to combine the teachings of Dunnett with Levy is equivalent to the motivation of claim 1.

Regarding claims 4 and 9, Dunnett teaches a local refinement of the first mesh is created by defining a second mesh in column 16 lines 54-58 ("*...to refine each triangular polygon in the model of an object into a larger number of smaller triangles which more accurately represent the object...*"), where it is described that a refinement of the mesh is defined, thereby resulting in a second subdivided mesh surface. Dunnett also teaches corresponding with one or more quads of the mesh and subdividing the quads of the first mesh into smaller quads of the second mesh in column 32 lines 1-5 ("*...each object may be modelled using other forms of polygons and patches other than triangular patches may be used to refine each polygon...each object may be modelled using rectangles.*"), where it is described that the surface of the mesh maybe represented using rectangular regions, or quad, in which the refinement of the mesh would therefore represent smaller quad regions of the mesh. Dunnett fails to describe the topology of the second mesh with

a second G-map representation. Levy teaches described the topology of a mesh of arbitrary topology in the abstract lines 8-12 ("*The G-Map representation relies on no more than a single type of element together with a single type of relation to define the topology of arbitrary dimensional objects…*"), therefore the topology of the refined mesh, as taught by Dunnett, would be capable of a G-map representation provided by Levy.

Regarding claim 6, Dunnett illustrates an input interface for receiving topological input data representing vertices and faces of the mesh in column 7 lines 14-16 ("*…the 3D modelling data may be generated in computer 2 using a commercially available modelling package and instruction from a user via user input device 14.*"), in which the input data represents vertices and faces of the mesh, as described in column 12 lines 53-57 ("*…this database stores information about each triangle in each model, particularly about the edges and vertices of each triangle…*"). Dunnett illustrates a computer system 2 containing a processing means 4 in Figure 1. Dunnett illustrates associating coordinates in space with the vertices of the mesh in Figure 10 where it is shown that vertices of the mesh have a corresponding coordinate. Dunnett teaches creating a geometric description, or topology, from the mesh in column 7 lines 52-54 ("*…CPU 4 constructs and stores a topology database for each model of each object.*") and in column 6 lines 65-67 ("*…three-dimensional modelling data defining one or more objects…This data comprises a polygonal mesh model…*") and, where it is described that a topology of the mesh is constructed. Dunnett illustrates creating a refined mesh based on the first mesh and the coordinates, in Figure 2, where it shown in step s16 that the mesh model is refined based on the input topological data that comprises the coordinates and vertices of the mesh, as shown in step s6. Dunnett teaches using coordinates associated with the vertices, as shown in Figure 10, of the

refined mesh, as described in column 16 lines 54-58 ("*...to refine each triangular polygon in the model of an object into a larger number of smaller triangles which more accurately represent the object...*") to compute control points, as described in column 12 lines 46-47 ("*Control points 90, 96 and 102 are located at the triangle vertices.*"), and using the control points to create surface patches associated with the first mesh in column 12 lines 43-46 ("*...control points are used to calculate the ordinates which define a cubic Bernstein-Bezier triangular patch...*"). However, Dunnett fails to teach creating a G-map representation of the topology of the mesh based on the input data. Levy teaches creating a G-map representation of the topology a mesh in the abstract lines 8-12 ("*The G-Map representation relies on no more than a single type of element together with a single type of relation to define the topology of arbitrary dimensional objects...*"), therefore it one of ordinary skill would have been capable of utilizing any arbitrary topology data to construct a G-map representation, such as the input topology data taught by Dunnett. Therefore it would have been obvious to one of ordinary skill in the art to combine the teachings of Dunnett with Levy because this combination would provide an improved representation of a surface of arbitrary topology by representing the refined mesh surface using generalized maps.

Regarding claims 11-13, Dunnett teaches a computer system containing various processing means comprises a combination of computer program instructions and general purpose hardware in column 38 lines 7-10 ("*...processing is performed by a computer using processing routines defined by programming instructions. However, some, or all, of the processing could be performed using hardware.*").

Regarding claims 14-17, Dunnett teaches a computer readable medium in column 7 lines 8-13 ("*The 3D modelling data at step S2 may be input to computer 2 on a storage medium, such as disk 10, via disk drive 8, may be transmitted to computer 2 via a communication network such as the Internet, for example from another computer or a database…*"), such as a disk or CD-ROM, magnetic storage or hard disk, or a signal transmitted over the Internet.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Said Broome whose telephone number is (571)272-2931. The examiner can normally be reached on 8:30am-5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ulka Chauhan can be reached on (571)272-7782. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

S. Broome
9/1/06 SB

Kimbinh Nguyen

KIMBINH T. NGUYEN
PRIMARY EXAMINER